

URBAN AND COMMUNITY FORESTRY STEWARDSHIP IN BALTIMORE: ASSESSING OPPORTUNITIES USING CONJOINT ANALYSIS

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Abstract

This paper reports a preliminary review of a study of preferences toward individual design attributes for urban environments as well as overall urban-design preferences of residents and stakeholders in the greater Baltimore area. Conjoint techniques will be used to solicit and analyze stakeholder preferences. Personal interviews and focus-group settings would be used to survey preferences and other respondent characteristics and attitudes. Once preference mappings are estimated for individual respondents, segmenting techniques such as discriminant analysis and clustering may be used to identify differences in preference among various groups or types of individuals.

1.0 Introduction

The city of Baltimore is in transition, attempting to rejuvenate itself following a long decline. The population has declined from 1.2 million in the 1950s to approximately 650,000 today. Many industrial sites and residential areas that have been virtually abandoned must be rebuilt. In one area alone, 90 city blocks have been demolished and await reconstruction. This renewal provides an opportunity to create an urban environment that is more aesthetically pleasing and ecologically healthy than the typical urban landscape. It is intended that new environments will attract both business and residents.

The Baltimore Ecosystem Study (BES) focuses on understanding the long-term dynamics effects of society on the ecological structure and function of the Baltimore region and Chesapeake Bay, and how the changing ecological structure of these areas affects the health,

welfare, and economy of the region. The study described here, one component of the much larger BES, will focus on soliciting and understanding the preferences of residents and prospective residents of these new neighborhoods toward their living environment. We are reporting only preliminary methodology in this paper.

2.0 Conjoint Analysis

Conjoint analysis is a technique for measuring psychological judgments. It is used frequently in marketing research to measure consumer preferences (Green et al. 1988). Respondents choose between alternative products or scenarios that display varying levels of selected attributes. The utility of each attribute can be inferred from the respondent's overall evaluations. These partial utilities or part worths indicate the relative importance of each attribute's contribution to overall preference or utility. They can be combined to estimate relative preferences for any combination of attribute levels. Conjoint techniques are well suited for soliciting and analyzing preferences in environmental decisions that frequently entail tradeoffs between costs and benefits that are not represented efficiently in market transactions. For example, Opaluch et al. (1993) described an approach that used paired comparisons to rank potentially noxious facility sites with respect to social impacts. Dennis (1998) used a conjoint ranking survey to solicit public preferences for various levels of timber harvesting, wildlife habitats, hiking trails, snowmobile use, and off-road vehicle access on the Green Mountain National Forest. And Lawson and Manning (2002) used a stated (dichotomous) choice model to analyze tradeoffs among social, resource, and management attributes of the Denali wilderness experience.

Choice experiments can be designed and analyzed in many ways. Respondents may be asked to indicate their preferences by choosing one of two or more options, ranking several options, or assigning numerical ratings to each option. Numerical ratings provide the most information but also place the greatest cognitive

demands on respondents. Green (1974), Green and Srinivasan (1978), Louviere and Woodworth (1983), and Louviere (1988) provide information on experimental design in the context of conjoint analysis.

A random utility model generally is used to explain preferences toward different mixes of attributes that may be used to describe an alternative, in this case an urban landscape. When presented with a set of alternatives, individuals are assumed to make choices that maximize their utility or satisfaction. The utility that the *i*th individual derives from the *j*th alternative (U_{ij}) can be represented as:

$$U_{ij} = X'_{ij} + e_{ij} \quad (1)$$

where X_{ij} is a vector of variables, which may include transformations of variables that represent values for each of the four attributes of the *j*th alternative to the *i*th individual; β is a vector of unknown parameters; and e_{ij} is a random disturbance, which may reflect unobserved attributes of the alternatives, random choice behavior, or measurement error.

A respondent's utility level (U_{ij}) for each alternative is not observed, but their choice of alternative is. Their choice of alternative, rating, or ranking is observed and is assumed to proxy for his or her underlying utility. McKelvey and Zavoina (1975) developed a polychotomous probit model to analyze ordinal level dependent variables. Other forms of multinomial probit and logit models are available to estimate other forms of choice representations.

3.0 Proposed Application for Baltimore

Interviews with key informants and focus-group surveys will be used to solicit expert and stakeholder knowledge about the study areas and preferences for adoptable urban-design scenarios. Attributes of the design scenarios may include percentage of tree or grass cover, housing density, road layout, or similar environmental features. We will work with urban designers from Columbia University's Graduate School of Architecture, Planning, and Preservation to generate design alternatives and visual components of the survey instrument.

Respondents may include key informants within the community, representatives of interested groups, or any community stakeholder with an interest in urban design. Examples of types of key informants are neighborhood association members, business owners, religious leaders, community gardening and forestry leaders, housing builders, developers, real estate professionals, local government agency representatives, grassroots organization leaders, and educators. Conjoint techniques allow estimation of a structure or map of each respondent's preferences toward individual choice attributes. In turn, these can be examined using discriminant analysis or clustering techniques to determine whether there are preferential differences among various groups or types of individuals. These differences also may be characterized and related to other databases such as PRIZM lifestyle marketing categories and supplemental marketing data based upon respondents' demographic and socioeconomic characteristics and residence location.

To implement this research, we will work with the Parks & People Foundation (P & P), which has extensive experience in organizing and facilitating neighborhood-based meetings and key-informant surveys. P & P will assist in convening and conducting the focus-group surveys. Respondents will be recruited through both targeted and open meetings. On the basis of P & P's experience, we expect to collect 100 to 125 conjoint surveys for each of three study areas within Baltimore.

4.0 Summary

To enhance the potential for a successful revitalization, Baltimore officials are interested in learning more about the preferences of residents and business toward alternate urban landscapes, particularly with respect to environmental and ecological aspects. We plan to conduct a conjoint survey designed to solicit such preferences and provide the means to analyze acceptable tradeoffs among various design attributes, as well as determine the optimal overall design preferred by various types of prospective residents. A clearer understanding of the preferences of prospective residents and business will help create a more attractive urban environment and aid in revitalizing the city while providing both social and economic benefits.

5.0 Citations

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